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RELATIVE HUMIDITY IN GEORGIA
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Humidity is a measure of the water vapor content of the air. The humidity may be expressed as vapor pressure, absolute humidity, specific humidity, relative humidity, mixing ratio or dew point temperature. The most widely used, and possibly the best understood, of these terms is relative humidity. The relative humidity is the ratio, expressed in percent, of the actual water vapor in the air to the amount required to saturate the air at the existing temperature.

The capacity of the air to hold water vapor increases with an increase in temperature. The relative humidity therefore decreases with an increase in temperature when there is no change in the water vapor content of the air or in the atmospheric pressure. The effect of temperature on relative humidity is shown by the data in Table 1. Starting with saturation, or 100 percent relative humidity, at several temperatures, this table shows what happens to the relative humidity when the temperature is increased by 10° intervals. These are the changes that would occur with no changes in water vapor content of the air or in the atmospheric pressure. Although these conditions seldom, if ever, occur in nature, the table illustrates the important effect that changes in temperature have on relative humidity.

Many requests for information on relative humidity are received by the Weather Bureau. This is not surprising when the effect of humidity on human comfort and well-being is considered. Those suffering from certain types of diseases are especially sensitive to humidity and changes in humidity. Relative humidity is also important in poultry and livestock production and may be a factor in the growth and development of field crops. The incidence and spread of certain fungi, diseases and insects are often directly related to relative humidity. Many manufacturing processes, especially in the textile industry, are affected by relative humidity. This report is prepared with the hope that it will be useful in answering some of the requests for information on relative humidity in Georgia.

Relative humidity is measured and recorded by the Weather Bureau at only a few places in Georgia. This is not too great a problem, however, since the variation from one part of the State to another is comparatively small, on the average. For example, the diurnal, or daily, variation at any one place is much larger than the variation from one part of the State to another. This large daily variation is, of course, related to the large daily temperature variation but is inverse to the temperature variation; that is, the relative humidity is highest in the early morning when the temperature is lowest and is lowest in mid-afternoon when the temperature is highest. Seasonal variations of relative humidity at any one place are also small when compared with diurnal variations.

Table 2 shows the average hourly relative humidity by season for several Georgia cities. An examination of the data presented in this table makes possible several interesting statements:

1. The average diurnal, or daily, range of relative humidity is greater than 30 percent at all reporting stations and in all seasons, except in Atlanta and Athens where it is 24 and 26 percent respectively in winter.
2. Daily ranges are largest in fall, when they reach 43 percent at Macon and Augusta, and are smallest in winter.
3. The average relative humidity is highest in summer and, for most of the day, lowest in spring.
4. Hourly averages are highest from 5 to 8 a.m., when they reach the low 90's in all areas in summer, and are lowest from 2 to 4 p.m. when spring averages are only 50 percent, or less, in all areas.
5. Averages are slightly higher in the coastal area during most hours and in all seasons than in other parts of the State. However, for a few hours around midday, averages are higher at Athens and Atlanta, in both summer and winter, than at Savannah.
6. The greatest difference between any two stations at any one time is only 13 percent. This occurs at 6 to 7 p.m. between Savannah and Macon. Surprisingly, the statewide range is only 2 percent at one or more hours during each season and is less than 5 percent for several morning hours of each season.

The duration, or percentage frequency, of relative humidity below, or above, certain values is of importance in some operations. Table 3 shows, for the same locations given in Table 2, the percent of time, by season, that the relative humidity is below 30%, 50%, 70%, 80% and 90% respectively. Since some activities are confined to daytime, percentages are shown separately for all hours and for daytime hours (7 a.m. to 6 p.m.). The comparatively small variation from one place to another, especially during daytime hours, is again noteworthy.

The percent of time that the relative humidity is between successive values shown at the top of the Table is easily determined by subtraction. For example, the daytime relative humidity at Athens during spring is between 50% and 70%, 26 percent of the time. (64 minus 38).

The importance, from a comfort standpoint, of the simultaneous occurrence of certain temperature-relative humidity values is well known, especially to those suffering from arthritic or

respiratory ailments. The combination of these elements may also be a factor in manufacturing processes as well as industrial and agricultural operations. Table 4 gives the frequency of hourly occurrences of certain temperature-humidity combinations for Atlanta, Augusta, Macon and Savannah. Temperatures are shown by 5-degree intervals and the relative humidity breakdown is the same as in Table 3. To show the seasonal variation in temperature-relative humidity occurrences, Table 4 has been prepared for the middle month of each season--January, April, July and October. Total occurrences of relative humidity and temperature within each interval, and for the period of record, are shown at the bottom and right side of the Table, respectively. The periods of record are 1956-1961 for Macon and 1951-1960 for the other three places. The percent of the time that the relative humidity and temperature fell within each table interval, as well as the accumulated percent, is also shown at the bottom and the right side of the Table. The accumulated line, or column, will show at a glance the percent of time that relative humidity or temperature was above, or below, the values in the table headings.

The number of occurrences of, or the percent of the time with, temperature and relative humidity below, or above, the values in the Table headings, can easily be obtained from Table 4. For example to determine the number of hourly occurrences of both temperature less than 85° and relative humidity less than 80%, add table entries in, and above, the temperature line 80-84° and in, and to the left of, the relative humidity column 70-79%. For Atlanta during July, this total is 2684 hours for the 10 year period, or 36 percent of the time. (Table 4 C).

Although relative humidity is regularly recorded at only a few places in Georgia, satisfactory estimates of averages or frequencies for other places over the State can be interpolated from the above tables. Except for diurnal variations, large changes in temperature and moisture content, the major controls of relative humidity, occur only with changes in air masses. The geographic dimensions of air masses are such that large areas of the State are usually under the influence of the same air mass. It is for this reason that relative humidity averages and frequencies show only small variations over large areas.

Additional information on Georgia's climate may be obtained from the office of Weather Bureau State Climatologist, Agricultural Engineering Center, University of Georgia, Athens, Georgia 30601.

TABLE 1. Changes in Relative Humidity With Changes in Temperature Without Changes in Vapor Content or Pressure

Temp. °F	Relative Humidity in Percent						
30°	100						
40°	66	100					
50°	43	68	100				
60°	32	47	69	100			
70°	22	33	49	71	100		
80°	16	24	35	51	72	100	
90°		17	25	37	52	73	100
100°			19	27	38	53	74

TABLE 2. Average Hourly Relative Humidity by Seasons (Based on 4 years, 1961-1964)

	Mid	1a	2a	3a	4a	5a	6a	7a	8a	9a	10a	11a	Noon	1p	2p	3p	4p	5p	6p	7p	8p	9p	10p	11p	Daily Range	
Spring																										
Athens	74	76	79	81	82	83	84	84	78	72	66	60	57	53	51	49	49	50	53	59	64	68	70	72	35	
Atlanta	72	72	75	77	78	79	80	80	76	72	66	61	57	54	52	50	49	50	52	55	62	65	68	70	31	
Augusta	78	80	81	83	85	87	86	85	79	70	63	57	53	49	47	46	45	46	49	58	67	71	73	75	42	
Macon	73	77	78	81	83	84	86	85	79	71	63	56	51	47	45	43	43	44	47	52	59	64	67	70	43	
Savannah	82	83	84	85	86	87	88	86	80	71	63	57	54	51	50	50	51	54	59	65	71	75	79	81	38	
Area Range	10	11	9	8	8	8	8	8	6	4	2	3	5	6	7	7	7	8	10	12	13	12	11	12	11	
Summer																										
Athens	87	89	90	91	93	94	94	92	85	78	72	66	62	60	57	56	57	60	63	72	78	82	84	86	38	
Atlanta	85	86	88	89	90	91	91	90	85	80	74	69	65	63	61	60	60	61	64	68	75	79	82	83	31	
Augusta	86	88	89	90	91	92	93	90	83	76	69	63	58	56	56	55	55	57	61	67	75	80	82	84	38	
Macon	84	86	88	89	91	92	93	90	85	76	68	62	57	54	52	52	53	55	58	63	71	75	79	81	41	
Savannah	89	90	91	92	93	93	93	91	85	77	70	64	61	59	59	60	63	66	71	76	81	84	86	88	34	
Area Range	5	4	3	3	3	3	3	3	2	2	4	6	7	8	9	9	8	10	11	13	13	10	9	7	7	
Fall																										
Athens	80	82	84	85	87	88	88	84	81	82	83	84	81	75	67	61	56	53	51	50	50	54	61	67	70	38
Atlanta	77	78	80	81	81	82	83	84	81	75	67	61	56	53	51	50	50	52	57	63	68	71	74	75	34	
Augusta	86	87	88	89	90	90	91	91	86	78	68	59	54	51	49	48	48	51	61	70	76	79	82	84	43	
Macon	81	83	85	86	88	88	89	89	86	77	66	58	53	49	47	46	46	48	55	62	68	72	76	78	43	
Savannah	85	86	87	88	88	88	88	89	85	77	68	61	57	54	53	53	55	59	67	74	78	81	82	85	36	
Area Range	8	7	8	8	9	8	8	7	5	5	2	3	4	5	6	7	9	11	12	12	10	10	8	9		
Winter																										
Athens	75	77	79	80	81	82	82	81	78	78	75	71	67	62	59	57	56	58	63	66	69	71	72	74	26	
Atlanta	72	74	75	76	77	77	78	78	75	75	71	65	61	58	56	55	54	56	59	62	66	68	69	71	24	
Augusta	79	80	81	82	83	84	84	84	81	79	72	65	60	57	54	53	53	55	62	69	72	74	76	77	31	
Macon	75	77	79	80	81	82	83	82	77	77	71	64	58	54	52	51	50	51	56	60	64	67	69	73	33	
Savannah	81	82	83	83	84	84	85	85	80	75	66	60	57	55	54	55	55	58	65	70	75	77	79	80	32	
Area Range	9	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	7	5	5	6	7	9	10	9	

TABLE 3. Percent of Time Relative Humidity is Below the Indicated Values

	All hours	Daytime										
Spring												
Athens	4	7	24	38	51	64	65	75	78	84		
Atlanta	6	11	29	43	56	67	69	77	81	87		
Augusta	4	8	25	43	49	69	62	79	77	89		
Macon	8	15	30	47	54	69	68	79	82	89		
Savannah	3	6	19	34	43	66	57	79	75	89		
Summer												
Athens	*	*	12	22	38	61	53	76	73	87		
Atlanta	1	1	16	29	46	66	63	80	81	92		
Augusta	*	1	14	28	39	68	53	81	71	92		
Macon	*	1	17	31	42	66	57	79	78	92		
Savannah	*	*	7	14	33	61	49	78	72	91		
Fall												
Athens	1	3	15	28	40	59	55	71	72	82		
Atlanta	3	6	19	33	47	62	63	73	78	84		
Augusta	2	3	16	29	35	59	48	71	64	83		
Macon	4	7	20	34	43	62	57	73	75	84		
Savannah	1	1	10	19	32	55	47	70	68	84		
Winter												
Athens	3	5	20	31	48	57	62	68	74	78		
Atlanta	3	5	20	29	48	56	63	69	76	79		
Augusta	2	5	19	33	44	60	57	71	74	82		
Macon	7	12	27	39	53	63	67	74	81	85		
Savannah	2	5	16	28	41	58	56	70	75			
Year												
Athens	2	4	18	30	45	61	60	73	74	83		
Atlanta	3	6	21	34	49	64	64	76	79	86		
Augusta	2	4	18	33	41	64	54	76	70	87		
Macon	5	9	24	38	49	66	63	77	80	88		
Savannah	2	3	14	24	38	60	53	74	73	86		

* Less than 1

TABLE 4A Temperature-Relative Humidity Occurrences, January

		Atlanta				Augusta															
R.H. %	T° F.	0-29	30-49	50-69	70-79	80-89	90-100	Total	%	Acc%	R.H. %	0-29	30-49	50-69	70-79	80-89	90-100	Total	%	Acc%	
10-14	12	7	1					20	*	*	15-19	9	12	14	10	45	1	1			
15-19	4	44	8					56	1	1	20-24	39	38	89	58	224	3	4			
20-24	14	82	37	1				134	2	3	25-29	30	100	71	124	83	408	6	10		
25-29	1	50	246	74	17	3		391	5	8	30-34	1	55	168	94	141	219	678	9	19	
30-34	1	133	304	150	137	105		850	11	19	35-39	8	114	220	149	186	235	912	12	31	
35-39	10	144	359	309	195	331		1348	18	37	40-44	21	140	318	175	218	302	1174	16	47	
40-44	23	153	361	190	178	331		1236	17	54	45-49	20	171	277	146	136	329	1079	15	62	
45-49	20	236	279	127	156	269		1087	15	69	50-54	13	211	212	94	160	289	979	13	75	
50-54	28	194	156	114	130	332		954	13	82	55-59	41	178	124	76	104	234	757	10	85	
55-59	36	102	102	69	107	293		709	9	91	60-64	33	102	112	59	101	147	554	7	92	
60-64	15	45	79	56	82	174		451	6	97	65-69	11	67	119	86	75	41	399	5	97	
65-69	1	28	54	39	34	26		182	2	99	70-74	4	38	102	28	4	176	2	99		
70-74	8	17	12	4				41	1	100	75-79	9	43				52	1	100		
75-79		1						1	*	100	80-84						3	*	100		
Total	135	1111	2096	1192	1042	1864		7440			Total	152	1115	1846	1028	1352	1947	7440			
%	2	15	28	16	14	25					%	2	15	25	14	18	26				
Acc %	2	17	45	61	75	100					Acc %	2	17	42	56	74	100				

TABLE 4A Temperature-Relative Humidity Occurrences, January

		Macon						Savannah												
R.H. %	T° F.	0-29	30-49	50-69	70-79	80-89	90-100	Total	%	Acc%	R.H. %	0-29	30-49	50-69	70-79	80-89	90-100	Total	%	Acc%
		T° F.						T° F.												
15-19	18	6	1	1	25	1	1	15-19	4	4	2	2	2	2	2	2	10	*	*	
20-24	39	12	9	3	72	2	3	20-24	1	20	27	26	26	26	26	26	1	1	1	
25-29	23	119	60	25	2	231	6	9	25-29	5	94	62	80	80	80	80	80	15	256	4
30-34	6	76	130	46	43	22	323	9	18	30-34	27	191	71	109	79	477	7	11		
35-39	20	90	139	100	80	60	489	15	31	35-39	4	78	161	136	172	155	706	9	20	
40-44	36	98	136	98	69	140	577	15	46	40-44	13	140	231	180	183	234	981	13	33	
45-49	36	105	127	76	95	140	579	16	62	45-49	24	156	238	156	185	322	1081	15	48	
50-54	41	110	109	64	88	115	527	14	76	50-54	31	179	224	128	179	396	1137	15	63	
55-59	39	87	58	45	51	113	391	11	87	55-59	38	175	186	112	129	379	1019	14	77	
60-64	23	49	49	25	32	63	241	6	93	60-64	30	87	169	110	143	298	837	11	88	
65-69	12	27	42	18	39	24	162	4	97	65-69	12	78	135	89	90	72	476	7	95	
70-74	4	18	34	20	2	78	2	99	70-74	54	142	58	142	58	11		265	4	99	
75-79	7	13	1			21	1	100	75-79	15	85	2					102	1	100	
80-84	4					4	*	100	80-84	11	6						17	*	100	
Total	219	699	1017	569	534	682	3720			Total	152	1006	1886	1135	1309	1952	7440			
%	6	19	27	15	15	18				%	2	14	25	15	18	26				
Acc %	6	25	52	67	82	100				Acc %	2	16	41	56	74	100				

TABLE 4B Temperature-Relative Humidity Occurrences, April

T° F.	Atlanta					Augusta					R.H. %	0-29	30-49	50-69	70-79	80-89	90-100	Total	% Acc%	T° F.	R.H. %	0-29	30-49	50-69	70-79	80-89	90-100	Total	% Acc%										
	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79																													
500	500	1804	1977	912	843	1164	7200	Total	313	1486	1696	916	1110	1679	7200	Total	313	1486	1696	916	1110	1679	7200	Total	313	1486	1696	916	1110	1679	7200	Total	313	1486	1696	916	1110	1679	7200
%	7	25	27	13	12	16	21	%	4	21	24	13	15	23	7	%	4	21	24	13	15	23	7	%	4	21	24	13	15	23	7	%	4	21	24	13	15	23	7
Acc %	7	32	59	72	84	100	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %	Acc %							

TABLE 4B Temperature-Relative Humidity Occurrences, April

		Macon						Savannah												
R.H. %	T° F.	0-29	30-49	50-69	70-79	80-89	90-100	Total	%	Acc%	R.H. %	0-29	30-49	50-69	70-79	80-89	90-100	Total	%	Acc%
30-34	4	10	1	2	3	*	*	55-59	4	9	13	*	*							
35-39	5	29	28	9	9	80	2	40-44	15	33	22	106	1	1						
40-44	11	55	33	54	48	201	6	45-49	11	64	68	106	59	308	4	5				
45-49	4	31	67	67	43	286	8	50-54	3	29	114	75	161	90	472	7	12			
50-54	18	50	78	62	64	334	9	55-59	17	74	179	94	174	261	799	11	23			
55-59	30	73	114	85	148	176	17	60-64	19	151	176	125	289	663	1423	20	43			
60-64	76	116	129	101	165	99	686	19	65-69	48	224	205	168	404	576	1625	23	66		
65-69	92	108	160	96	47	20	523	15	70-74	57	176	279	234	201	111	1058	15	81		
70-74	70	118	159	26	1		374	10	75-79	35	203	423	140	26	827	11	92			
75-79	56	190	63				309	9	80-84	40	168	272	9		489	7	99			
80-84	25	115	12				152	4	85-89	6	44	17			67	1	100			
85-89	2	6					8	*	90-94	100	12	1			13	*	100			
Total	373	823	870	508	564	462	3600		Total	225	1092	1745	950	1406	1782	7200				
%	10	23	24	14	16	13		%	3	15	24	13	20	25						
Acc %	10	33	57	71	87	100		Acc %	3	18	42	55	75	100						

TABLE 4C Temperature-Relative Humidity Occurrences, July

		Atlanta					Augusta														
		R.H. %	0-29	30-49	50-69	70-79	80-89	90-100	Total	%	Acc%	R.H. %	0-29	30-49	50-69	70-79	80-89	90-100	Total	%	Acc%
T° F.												T° F.									
60-64		7	5	7					19	*		55-59							2	10	*
65-69		38	52	73	183	346	5	5	60-64			60-64							29	30	1
70-74		7	117	174	547	1324	2169	29	34	65-69		65-69	7	17	45	257	1315	1654	22	27	1
75-79		44	321	543	731	181	1820	25	59	70-74		70-74	2	35	45	209	1315	1654	22	27	5
80-84		1	150	832	393	66	1	1443	19	78	75-79		75-79	10	80	325	851	562	1828	25	52
85-89		5	334	632	20				991	13	91	80-84			50	409	589	202	8	1258	17
90-94		4	396	151					551	8	99	85-89			9	198	860	112	4	1183	16
95-99		18	72						90	1	100	90-94			2	396	472	2		872	12
100-104		10	1						11	*	100	95-99			8	208	30			246	3
												100-104			10	28			38	*	100
												105-109			3				3	*	100
Total		38	1004	2098	1187	1424	1689	7440				Total			32	892	1893	1090	1399	2134	7440
%		1	13	28	16	19	25					%			*	12	25	15	19	29	
Acc %		1	14	42	58	77	100					Acc %			*	12	37	52	71	100	

TABLE 4C Temperature-Relative Humidity Occurrences, July

		Macon						Savannah																			
		R.H. %	0-29	30-49	50-69	70-79	80-89	90-100	Total	%	Acc %	R.H. %	0-29	30-49	50-69	70-79	80-89	90-100	Total	%	Acc %						
T° F.												T° F.															
60-64		2		2		1		5	*	*	*	65-69	7		31	57	96	1	1								
65-69		4		14		47		65	2	2		70-74	5		40	275	1348	1668	22	23							
70-74		1		27		203		737	968	26	28	75-79	4		46	262	1058	831	2201	30	55						
75-79		32		202		530		202	966	26	54	80-84	1		29	382	729	353	8	1502	20	73					
80-84		5		236		281		61	583	16	70	85-89	1		108	973	143	4	1229	17	90						
85-89		91		463		22			576	15	85	90-94	1		165	426	1		592	8	98						
90-94		1		253		196			450	12	97	95-99	1		123	18			142	2	100						
95-99		3		101		5			109	3	100	100-104	1		10				10	*							
Total		4		450		933		536	810	987	3720	Total	5		439	1851	1182	1721	2244	7440							
%	*	12		25		14		22	27			%	*		6	25	16	23	30								
Acc %	*	12		37		51		73	100			Acc %	*		6	31	47	70	100								

TABLE 4D Temperature-Relative Humidity Occurrences, October
Atlanta Augusta

T° F.	R.H. %	0-29			30-49			50-69			70-79			80-89			90-100			Total			% Acc %							
		218	1262	1936	1103	1260	1661	7440																						
Total	218	1262	1936	1103	1260	1661	7440																							
%	3	17	26	15	17	22																								
Acc %	3	20	46	61	78	100																								
30-34	1	7	13	5	5	26	*																							
35-39	13	17	16	16	4	66	1	1																						
40-44	2	19	45	28	57	24	173	2	3																					
45-49	4	45	98	106	140	41	434	6	9																					
50-54	10	83	245	158	155	244	895	12	21																					
55-59	19	127	303	169	263	366	1247	17	38																					
60-64	38	207	297	218	259	419	1438	19	57																					
65-69	50	247	322	189	203	388	1399	19	76																					
70-74	54	179	274	117	137	158	919	13	89																					
75-79	33	202	199	80	24	7	545	7	96																					
80-84	8	74	125	9	1		217	3	99																					
85-89		46	16				62	1	100																					
90-94		46	17				17	*	100																					
95-99		2					2	*	100																					
Total	218	1262	1936	1103	1260	1661	7440																							
%	3	17	26	15	17	22																								
Acc %	3	20	46	61	78	100																								

TABLE 4D Temperature-Relative Humidity Occurrences, October

		Macon						Savannah														
		R.H. %	0-29	30-49	50-69	70-79	80-89	90-100	Total	%	Acc %	R.H. %	0-29	30-49	50-69	70-79	80-89	90-100	Total	%	Acc %	
T° F.																						
30-34			1	8																		
35-39		2	3	6	5																	
40-44		4	15	29	13	61	2															
45-49		2	11	33	53	13	112	3														
50-54		5	68	69	69	103	314	8														
55-59		25	93	95	152	185	548	15														
60-64		7	56	98	109	121	317	708	19													
65-69		24	74	153	89	136	236	712	19													
70-74		25	99	138	67	80	141	550	15													
75-79		29	105	130	55	33	23	375	10													
80-84		12	112	86	9																	
85-89		74	74	17																		
90-94			4	1																		
Total		97	556	801	543	687	1036		3720													
%		3	15	21	15	18	28															
Acc %		3	18	39	54	72	100															